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Is a simpler approach to the diagnosis of cardiotoxicity accurate? Comparison of single-view and standard assessment of global longitudinal strain

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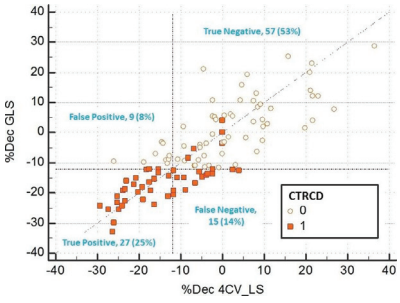
Background: Global longitudinal strain (GLS) is a sensitive marker of LV dysfunction that facilitates early detection of cancer therapeutics related cardiac dysfunction (CTRCD). Standard GLS is derived from 3 apical views. However, as patients require repeated testing and CTRCD is a diffuse process, single view GLS could improve efficiency.
Purpose: We sought whether 4 chamber view GLS (4CV_LS) could substitute GLS for the detection of CTRCD in an international multicenter study.
Methods: In patients receiving Anthracycline-based chemotherapy, enrolled from 17 international institutions (7 Europe, 2 North America, 5 Asia and 3 Australia), ejection fraction (EF), GLS and 4CV_LS were measured at baseline and follow-up, and the differences between them were calculated. Asymptomatic CTRCD was defined as EF>0.10 decrease with to <0.55, or GLS>12% decrease. A Bland-Altman plot (BA plot) was used for evaluation of concordance.
Results: Of 108 patients (54±13 years, 101 women), 95 had breast cancer, 13 had hematologic malignancy. There were good correlations between GLS and 4CV_LS at baseline and follow-up (r=0.86 and 0.89, both p<0.0001). BA plots demonstrated minimal bias (0.21 at baseline; 0.03 at follow-up) but modest limits of agreement (2.54% and 2.19%). Of 47 patients developing CTRCD, 4CV_LS yielded 15 (14%) false negatives and 9 (8%) false positives, resulting in a discordance rate of 22% to detect CTRCD (Figure).



Conclusions: 4CV_LS has good correlation with GLS, but our study indicates that it could lead to significant misdiagnoses. We recommend standard GLS from multiple apical views for patients with risk for CTRCD.
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Incremental value of resting 2D and 3D speckle-tracking echocardiography compared to exercise ECG testing to identify coronary artery disease in intermediate risk patients

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Background: Non-invasive assessment of stable coronary artery disease (CAD) remains challenging in the everyday practice. Despite widespread use of stress echocardiography, CMR and SPECT, according to the 2013 ESC guidelines on stable CAD management, exercise ECG testing (ECG-T) remains the most widely non-invasive used method. Speckle tracking imaging is a promising new method to evaluate ischemic heart disease.
Aims: We investigated the diagnostic value of 2D and 3D speckle tracking echocardiography in intermediate risk patients with normal global and regional systolic function referred for angiocoronarography due to positive ECG-T.
Methods: Consecutive suspected CAD patients with positive ECG-T were included. The ESC recommended clinical pretest probability (PPT) of CAD was evaluated in all patients. 2D speckle-tracking echocardiography was performed the day prior to planed coronary angiography and included Global longitudinal strain (GLS), Global post systolic shortening (GPSS), Global early systolic lengthening (GESL) and Territorial longitudinal strain (TLS). The following 3D speckle-tracking parameters were acquired: Global longitudinal strain (3DTGLS), Global radial strain (3DTGRS), Global circumferential strain (3DTGCS), Global area strain (3DTGAS) and Global and segmental Torsion and Twist rate. CAD was defined as the presence of at least one stenosis ≥50% in diameter. ROC analysis was performed to determine the cut-off value of 2D-Strain and 3D strain parameters that optimally identified the presence of CAD.
Results: 83 patients with average age of 62.3 were included. The clinical PTT was 58,9% ± 22,9. CAD patients (n=36) presented a significant higher PTT (69±23% vs 52±24%, p<0,01). 2D GLS was significantly impaired in CAD patients (-18,47±2,53 vs. -21,77±2,20 p<0,01). As well, 3DT GLS and 3DT GAS were significantly lower in CAD patients (-10.6±2,4 vs -13.9±4,0 p<0,01 and -22,7±4,6 vs -26,1±5,6 <0,01 respectively). 3DT GCS, twist and torsion were not different between groups. ROC curve analysis showed a significant diagnostic value of 2D GLS to identify CAD (AUC=0,85, p<0.0001) with a sensitivity of 83% and a specificity of 75% at the optimal cut-off of -19,5%. Multivariate regression analysis showed that GLS was the only predictor of CAD (OR 14.3, CI 4.67–44.54, p<0,01).
Conclusion: Our results suggest that 2D GLS represent an additional reliable tool in patient with positive ECG-T suspected of stable CAD in day use practice.

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Does acute cellular rejection affect all the cardiac segments in the heart transplant? An approach by speckle tracking echocardiography

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Introduction: Acute cellular rejection (ACR) is a major complication after orthotopic heart transplant and early diagnosis seems essential for prompt initiation of imunossupressive treatment and prevention of graft loss. Although endomyocardial biopsy (EMB) remains the gold standard for diagnosis, it is invasive and associated with complications. Speckle tracking echocardiography (STE) is a recently introduced technique that enables the analysis of left ventricular contraction dynamics, making possible the early detection of myocardial dysfunction.
Purpose: To evaluate the left ventricular dynamics in heart transplanted patients in comparison with normal non-transplanted patients and to determine the usefulness of STE for detection of ACR after heart transplantation.
Methods: From April 2014 to December 2016, we prospectively studied 58 transplanted patients (mean age 44±11 years, 23 female) with normal ejection fraction (EF>0.55), which underwent EMB for either surveillance or clinical suspicion of ACR. As the control group, we studied 58 normal non-transplanted patients (mean age 43±9, 23 female). ACR was graded according to the revised International Society of Heart and Lung Transplantation (ISHLT) criteria, and defined as significant with grade 2R or more. All patients underwent conventional and STE 48 h before EMB. Conventional echocardiographic parameters, STE-derived left ventricular longitudinal, radial, and circumferential strain and strain rate were determined.
Results: All echocardiographic parameters derived from STE were lower (absolute values) in transplanted patients compared to normal subjects: global longitudinal strain (13.87±3,39% vs 21.4±2,27%, p<0,001), global longitudinal strain rate (1.12±0.17 1/s vs 1.2±0.16 1/s, p<0,001), global circumferential strain (13,27±3,36% vs 18,43±2,96%, p<0,001), global radial strain (30.44±14% vs 47.5±14,65%, p<0,001), twist (16.14±6,3ovs 18.96±4,71o). Among the 58 studied transplanted patients, significant ACR was detected in 14 (24%). STE echocardiography showed lower left ventricular contractility in the antero-septal wall in patients with significant ACR, when compared in patients without ACR, as determined by longitudinal strain (11.88±4.84% vs14.71±4.26%; p=0.03) and strain rate (1,00±0.26 1/s vs 1.22±0.25 1/s; p=0.012). An average antero-septal longitudinal strain <11.7% had 57% sensitivity and 82% specificity for the presence of significant ACR.
Conclusions: Transplanted patients have its own ventricular dynamics, with deformation values and its derivatives (strain, strain rate and twist) lower than non-transplanted patients. The strain and strain rate derived from STE were markers of ACR. Our data suggest that this technique is suitable for detecting regional changes in left ventricular deformation during an episode of ACR.

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Speckle tracking derived right atrial strain parameters show strong correlation with phasic volume indices in systemic sclerosis patients

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Background: Right atrial (RA) size and function is a novel focus of research in conditions involving the right heart, such as systemic sclerosis (SSc). Parameters of the RA function may serve as additional markers of the disease progression, may show potential prognostic value or reflect functional capacity. Several methods such as volumetric measurements with two- or three-dimensional echocardiography or cardiac MRI, and the novel method of speckle tracking echocardiography are used for the assessment of the RA function. Nevertheless, the new, speckle tracking derived parameters of the RA reservoir, conduit and contractile function have never been validated against the classical phasic volume indices. The aim of our study was to evaluate the correlation between volumetric and 2D